A COMPARATIVE STUDY TO ASSESS THE EFFECTIVENESS OF COMBINED TENS AND EXERCISES OVER EXERCISE ALONE FOR SACRO-ILIAC JOINT PAIN IN PREGNANCY

ULTRA TRUST

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A Dissertation Submitted To
THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY CHENNAI.
In Partial Fulfilment Of The Requirements For The Degree Of
MASTER OF PHYSIOTHERAPY

APRIL - 2011

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EXAMINER - 1 _____

EXAMINER - 2 _____

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CERTIFICATE

THIS IS THE BONAFIDE WORK OF MASTER OF PHYSIOTHERAPY STUDENT **K. ABDUL SALAM** FROM **TRININY MISSION AND MEDICAL FOUNDATION, COLLEGE OF PHYSIOTHERAPY (RUN BY ULTRA TRUST)** SUBMITTED IN PARTIAL FULFILLMENT FOR THE REQUIREMENT OF THE DEGREE OF **MASTER OF PHYSIOTHERAPY** UNDER **THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI.**

Reg No:27091209

PRINCIPAL **HEAD OF THE INSTITUTION**

Date :

Place :

ACKNOWLEDGEMENT

I express my heartfelt thanks to **"THE ALMIGHTY"**, **my Parents** and **my Family members** for their support and blessings to me in completing this project.

My sincere thanks to our Chairman, **Prof. K.R. ARUMUGAM** for providing the opportunity to do this project.

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I wish to thank our Librarian **Mr. THIRUNAVUKKARASU** for providing me with necessary Literatures and Journals.

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Thanks to all involved in the successful completion of this project.

INTRODUCTION

Pregnancy not only bring the Joy of motherhood to a women but also alteration and change in the normal tone and mechanics of the Musculeskeletal system.

Of all the structures the Spine and low bark region experiences major turn over in postural alterations, altered Biomechanics, exaggerated curvature, altered weight shift and strain in the joints and muscles.

OSTGAARD and ANDERSON studied 817 women with Sacro-Iliac joint pain. 67% of the mothers experienced pain immediately after delivery. 30% experienced pain 3 months after delivery.

Sacro-Iliac Joint pain is therefore very significant and requires early care and treatment to avoid a Chronic pain situation.

It is important to regain the strength of their abdominal muscles, after the birth of baby as strong muscles help prevent back strain and injuries.

SACRO-ILIAC JOINT DYSFUNCTION :

Pregnancy could have many possible effects on the Sacro-Iliac joint : for example joint laxity may allow repetitive new movement at one, or both, joints causing pain, if combined with sufficient activity. The newly permitted movement could result in the uneven surfaces becoming 'fixed', therefore rendering the joint immobile and having a mechanical effect upon the other joint. Both anterior and posterior torsion, or rotation of the ileum on the sacrum, [1] have been described, but there is disagreement as to which is the more common (Don Tigny 1985). It seems likely, however, that the complex and highly individual configuration of the Sacro-Iliac joint allows for any number of possible directions of movement. The increased weight during pregnancy thrusts the sacrum downwards between the ilia in all upright postures, and in walking, each Sacro-Iliac joint alternately transmits the total loading. Is there a potential for the joint to fail as a result of joint laxity? Certainly sclerosis of the Sacro-Iliac joints (e.g. osteitis condensans ilii) is seen on X-ray after childbirth. Schemmer et al (1995), using plain film, arteriography and computed tomography (CT), found a statistically significant association of osteitis condensans ilii with parity. This usually disappears in a few months, but indicates transient stress. A support belt may provide comfort for some women.

Changes in orientation or degrees of movement at a Sacro-Iliac joint may affect the symphysis pubis, and also the spine. It has also been shown that pain from the lumbar spine, and occasionally from the hip, may be referred to the Sacro-Iliac region, and there is no doubt that disorders of the lumbar spine and Sacro-Iliac joints can coexist. Thus pain experienced over a Sacro-Iliac joint is not synonymous with disorder of that joint; other possibilities must be explored and other confirming or refuting signs sought. Accurate and thorough assessment is essential if treatment is to be successful.

NEED FOR THE STUDY :

- To evaluate the effect of combined TENS & exercises in minimizing Sacro-Iliac Joint pain in pregnancy.
- To minimize the Sacro-Iliac Joint pathology in the post partum period.
- To set up a exercise protocol during pregnancy.

STATEMENT OF THE PROBLEM :

A comparative study to assess the effectiveness of combined TENS and EXERCIES OVER EXERCISE ALONE for Sacro-Iliac Joint pain in pregnancy.

OBJECTIVES :

- To evaluate the effectiveness of arrlicanon of TENS combined with structured exercise training program.
- To improve awareness about Sacro-Iliac Joint pain during pregnancy.
- To improve Sacro-Iliac Joint stability.

HYPOTHESIS :

TENS WITH Exercise programme is effective then exercise alone in reducing Sacro-Iliac Joint pain in pregnancy.

ASSUMPTIONS :

- TENS with exercise programme will reduce Sacro-Iliac Joint pain in pregnancy.
- TENS with exercise programme will improve Sacro-Iliac Joint stability in pregnant mothers.
- The independent variables were TENS and Exercise Programme.
- The Dependent variable were Sacro-Iliac Joint Pain and Stability.

OPERATIONAL DEFINITIONS :

1. EXERCISE PROGRAMME :

Exercise Programme is the application of physical means for the relief of Symptoms and to improve functions of the body (or) its functioning capacity.

2. TENS :

Transutaneous Electrical Nerve Stimulation (TENS) is a pulsed rectangular

wave current through surface electrodes on patient skin.

3. PAIN :

PAIN is defined as an Unpleasant Sensory and Emotional Experience associated with actual (or) potential tissue damage.

4. SACRO-ILIAC JOINT PAIN :

PAIN experienced by the pregnant mothers over the Sacro Iliac area causing discomfort in posture and activities.

LIMITATIONS :

- This study is limited to the population of pregnant mothers with Sacro-Iliac Joint pain attending out-patient department of OB & G at Meenakshi Mission Hospital, Madurai.
- This study is limited to a population of 10 mothers with 5 in each group.
- This study is limited to mothers without any associated complications.
- This study is limited to mothers who underwent preliminary education classes.

SACRO ILIAC JOINT PAIN

The SACRO ILIAC JOINTS are formed by the connection of Sacrum and the right and left iliac bones. The Sacrum is the triangular-shaped bone in the lower portion of the spine below the lumbar spine.

While most of the bones of spine are mobile, the Sacrum is made up of 5 vertebrae that are fused together and do not move. Yhe iliac bones are the two large bones that make up the pelvis. As a result the Sacro-Iliac Joints connects the spine of the pelvis.The Sacrum and the iliac bones are held together by a collection of strong ligaments. There is relatively motion at the Sacro-Iliac Joints.

There are normally less than 4 degrees of rotation and 2 mm of translation of three joints. Most of the motion in the area of pelvis occurs either at hips or the lumbar spine.

These joint need to support the entire weight of the upper body when we are erect, which places a large amount of stress across them. This can lead wearing of the carriage of Sacro-Iliac causing pain.

SACRO-ILIAC JOINT DYSFUNCTION :

There are many different terms for Sacro-Iliac Joint problems including Sacro-Iliac Joint Dysfunction, Sacro-Iliac Joint Syndrome, Sacro-Iliac Joint Spain, Sacro-Iliac Joint inflammation. Each of these terms refers to a condition that causes pain in the Sacro-Iliac Joints.

CAUSES :

As like other joints, the Sacro-Iliac Joints are a carriage layer covering the bone. The carriage allows for some movement and acts as a shock absorber between the bones. When this carriage is damaged or worn away degeneration occurs causing pain.

During pregnancy, the release of major hormones in the women's body that allows ligaments to relax. This prepares the body for child birth. Relaxation of the ligaments holding the Sacro-Iliac Joints together allows for increased notion of the Joints and can lead to increased stresses and abnormal wear. The additional weight and walking pattern associated with pregnancy also places additional stress on the Sacro-Iliac Joints.

Also any associated plan that alters the normal walking pattern places increased stress on the Sacro-Iliac Joints. This includes limb length discrepancy, pain in hip or lower extremity.

PATHOMECHANICS :

Pregnancy could have many possible effects on the Sacro-Iliac Joint. Laxity may allow repetitive new movement at one or both joints causing pain, if combined with sufficient activity.

The newly permitted movement could result in the universe surfaces, becoming fixed therefore rendering the Joint immobile and having a mechanical effort upon the other joint.

Both Anterior and Posterior torsion or rotation of the ilium on the sacrum is altered causing pain. The complex and highly individual. Configuration of the Sacro-Iliac Joint allows for any number of possible directions of movement.

OUTCOMES :

- The increased weight during pregnancy thrusts the Scrum downwards between the ilia in all upright postures.
- Changes in orientation of movements at the Sacro-Iliac Joint is noted.
- Symphysis pubis and spine are alternatively affected.
- Referred pain from the lumbar region may also be transmitted.
- Differential diagnosis is essential to rule out any other synonymous pathology.

SYMPTOMS :

The most common symptom of Sacro-Iliac is pain. Pregnant mothers after experience pain in the lower back or back of hips.

Pain also felt in the groin and thighs.

- Pain is typically worse with standing and walking.
- Pain reduced in lying down.
- Pain due to arthritis produces stiffness and burning sensation in the pelvis.

DIAGNOSIS OF SACRO-ILIAC JOINT PAIN :

- Questionnaire helps to identify any underlying disorders causing pain and also to differentiate pain from Sacro-Iliac Joints hips or lumbar spine.
- Physical examination helps to isolate the source of pain. Sacro-Iliac Joints are moved (or) compressed in lying positions to determine the pain.

TREATMENT :

Proper explanation to the mother helps her to understand her problem.

ASSESSMENT :

A proper assessment of the mother prior to the treatment helps in an effective treatments outcome and reduce risk of producing any other complications.

SUBJECTIVE EXAMINAITON :

- Questionnaire method : Several questions related to the problem are listed and given to the mothers to answer IT includes.
- Status of mother - anxious, stressed, tired
- Perinea serrations
- Micturation habit charger
- Stress incontinence
- Pain
    - ❖ site
    - ❖ type
    - ❖ frequency
    - ❖ aggravating factors
    - ❖ relieving factors
- Hyperalgia
- Numbers of perineum
- Urinary tract injections to rule out back pain.
- Onset of symptoms

Previous deliveries

OBJECTIVE EXAMINATION :

Is carried out with utmost care and precaution.

- Positioning
    - ❖ for stability and comfort.
    - ❖ Side lying is usually painless and tolerated.
- Mobility
    - ❖ Joint mobility
    - ❖ Trunk mobility
    - ❖ Joint range
    - ❖ Joint level
- Functional Assessment
    - ❖ Range of movement
    - ❖ Stiffness
    - ❖ Pain
    - ❖ Lengh / levels
    - ❖ Contours
    - ❖ Sensation
    - ❖ Power
    - ❖ Reflexes
- Palpation
    - ❖ For odema and tenderness

METHODOLOGY

RESEARCH DESIGN :

The research design adapted for this study was a comparative study.

SETTING OF THE STUDY :

The study was conducted in Department of obstetrics and gynecology at Meenakshi Mission Hospital, Madurai.

POPULATION SAMPLE :

Pregnant mothers attending the materning department with Sacro Iliac Joint pain were selected for the study. The sample 10 subjects were divided into 2 groups. 5 in each group.

EXPERIMENTAL GROUP - I :

This group was exclusively treated with TENS and Exercise programme.

EXPERIMENTAL GROUP - II :

This group was treated with Exercise programme alone.

CRITERIA FOR SELECTION :

INCLUSION CRITERIA :

1. Pregnant mothers with Sacro Iliac Joint pain were selected.
2. Primipara mothers.
3. Co-operative mothers.

EXCLUSION CRITERIA :

1. Pregnant mothers with any other pathological conditions.
2. Multiple Deliveries.
3. Un-Cooperative mothers.

INSTRUMENTS :

- **TENS (TRANSCUTANEOUS ELECTRICAL NERVE STIMULAITON)**

TENS was the mode of treatment selected for Experimental Group I. The apparatus was checked thoroughly for its reliability.

MODE OF TREATMENT :

PARAMETERS

- Mode - Burst Mode

  (Low frequency bursts of high frequency stimulation)
- Treatment Time - 30 minutes
- Repetition - Twice day

- **MODE OF ACTION**

This type has the properties of both conventional TENS and acupuncture like TENS. Stimulation of Aδ fibres and Aβ fibres to inhibit the C fibre mediated pain sensation pre synoptically at spinal segmental level.

- **POSITION :**

Forward lean sitting with proper support and less stress to the abdomen.

- **PLACEMENT OF ELECTRODES**

The electrodes are placed over the related vertebral segments over the painful area in the Sacro iliac region.

❖ **EXERCISE PROGRAMME :**

Mothers with Active work and who are physically fit tend to have easiest labours than these with a more sedentary life style. Exercise programems are designed based on the following criteria.

- Individual fitness levels.
- Intensity and type of exercise.
- Individual factors affecting pregnancy.

The effects of exercise in pregnant mothers are based on the physiological changes, Aerobic exercise tend to maintain women's internal homeostasis.

RISK OF IMPROPER EXERCISE PROGRAME :

❖ **Maternal Risks :**

- Musculoskeletal trauma.
- Excessive cardiac stress.
- Hypoglycarmia with excessive work out.
- Altered Thermo regulation.
- Altered Minute ventilation.

❖ FOETAL RISKS

- Foetal distress with vigorous and prolonged exercise.
- Altered foetal grown and development.
- Foetal malformations.
- Preterm labour

TREATMENT :

A careful ‘gapping’ of the joint, enabling it to return to a more normal approximation on release, has been shown to be effective in cases of joint ‘fixation’.

Technique 1 : With the woman lying supine, and the knee of the affected side flexed, the toes are hooked under the lateral aspect of the straight knee. The therapist passively takes the flexed knee across the body while holding the shoulder of the affected side against the plinth. Thus tension is applied to the affected Sacro-Iliac joint and any slack is ‘taken up’, at the end of range a single, gentle thrust is given. The woman may benefit from repeating this position at home, with or without a gentle rocking movement, but minus the thrust.

Technique 2 : For the left Sacro-Iliac joint, the woman lies supine, trunk fully supported, right leg relaxed and straight, grasping the left flexed knee at the level of the tibial tubercle with the left hand. The left hip is rotated

laterally sufficiently to allow the left calcaneum to be cupped in the right hand; she gently pulls the left knee towards a point just lateral to the left shoulder, and the left heel is eased toward the right groin. The pressure is then released and reapplied once or twice. It is suggested that if performed once or twice daily this will encourage normal correlation. Advocates (Fraser 1976) usually recommend that the movement is then repeated on the other side.

Technique 3 : Sit or standing (Don Tigny 1985) with the hip and knee of the affected side flexed and the foot up on a chair or bench the woman rocks forward to the knee and back.

Technique 4 : Cyriax recommended - the woman lying (on bed / plinth), crosses the leg of the affected side over the other, and rotates the lower trunk to allow the lower leg of the affected side to dangle over the side of the bed, thereby exerting traction through the leg and hip to the Sacro-Iliac joint. The position is maintained, relaxed, for 10-20 minutes then activity is resumed carefully.

Technieque 5 : Lying, a sharp longitudinal 'leg pull' is performed on the affected side, with the leg slightly abducted (Golightly 1982). Sudden traction through the capsule of the hip joint to the ilium can, in some cases, unlock the Sacro-Iliac joint surfaces and so assit with a return to the usual

alignment. This, however, is a very traumatic approach and should not be entered into lightly.

Technique 6 : The author uses lying, with hips at 90^{o}, and lower legs supported horizontally (by a solid surface) the woman presses with her thigh (affected side) against a firm surface, holds, and releases. It is essential that the woman has full understanding of her 'problem', and knows how best to maintain the correction and prevent recurrence.

Side lying is usually the most comfortable resting position with a pillow between the knees or forward under the top knee. The knees should be kept together and 'crooked' when turning over in bed. Work involving leaning forward should be avoided, but when essential, placing a foot on a

..14..

low stool, or equivalent, controls the anterior rotation of the pelvis to some degree (but not if suffering the symptoms of SPD). If the abdominal muscles are weak, and if it is realistic to attempt strengthening exercises, this should be done. A supportive belt applied following a manoeuvre may increase comfort and help avoid recurrence of the malposition. Where recurrence does happen, the therapist will have to decide how often it is wise to manipulate in this way. Repetitive reductions could encourage further joint instability, perhaps even in the longer term.

It may be that, in the early stages, rest can facilitate a reduction in inflammation and oedema, and where there is torsion then general relaxation and gentle non-weight-bearing movements in the bed may allow the joint to return naturally to its normal position.

TENS may be a useful adjunct to corrective and preventative therapy in the early, painful phase, but it is important for the patient to understand that this temporarily masks the pain rather than curing its cause.

SCIATICA :

When a pregnant woman complains of sciatica, her obstetrician may possibly suggest it is the baby sitting on a nerve. However, this, unless the woman is near term, seems unlikely. Sciatica may accompany backache and Sacro-Iliac joint dysfunction; it will rarely occur alone. The L4 and L5 comporent of the sciatic nerve, due to its course, would become involved in any dysfunction or inflammatory reaction at this site. An increased lumbar lordosis resulting in lying and standing would also change the lie of these roots. Increased loading may result in the spinal foramina being reduced in size with consequent root compression. Disc lesions are not unknown, and is it impossible for abdominal adhesions (e.g. following infection or surgery) to be another causative factor?

TREATMENT :

Management of the symptoms is by far the best approach, with reduced activity levels, within pain free range. Advice from the physiotherapist on positioning, back care, posture correction, activities of daily living and pain relief can be taken ‘as read’.

CONTRAINDICATIONS :

Currently there are the three main bodies which offer recommended guidelines and contraindications for exercise in pregnancy; There is some disagreement as regards interpretation of current research to optimise safety of mother and foetus but the following table gives some guidance.

Women in these categories tend to be aware of their limitations; there is no reason, however, why routine antenatal exercises for leg circulation, pelvic floor muscles and gentle movements to maintain good posture and back comfort (e.g. pelvic tilting) should not be taught and practised regularly. Activities that may be contraindicated include competitive and contact sports, and activities such as horse riding, skiing, waterskiing and scuba diving carry far greater risks when a woman is pregnant.

Absolute	**Relative**
• Cardiovascular disease • Acute infection • A history of recurrent spontaneous abortion (miscarriage) • Preterm labour in current or previous pregnancy • Multiple pregnancy • Vaginal bleeding or ruptured membranes • Incompentent cervix • Pregnancy-induced hypertension • Suspected IUGR or foetal distress • Thrombophlebitis or pulmonary embolism • Chronic hypertension, active thyroid, cardiac, vascular or pulmonary disease • Diabetes type 1 uncontrolled	• Women unused to high levels of exertion • Blood disorders such as sickle cell disease and anaemia • Thyroid disease • Diabetes - however, a carefully supervised programme of gentle exercising may actually benefit some patients • Extreme obesity or underweight • Breech presentation in third trimester

REVIEW OF LITERATURE

1) Nilson. Wikmar L, Holm K, OijerstedtR, et al. Effects of different treatments on pain & on functional activities in pregnant womens with Sacro Iliac joint dysfunction.

2) Berg G, Hammar M, Moller Nielson J. et al assess the effects of Sacro Iliac dysfunction during pregnancy.

3) Fry D. Hay smith J, Hough J. et al. National clinical guidelines for the care of women with Sacro Iliac dysfunction.

4) The visual analog scale which is used on this study has already been shown to be valid & reliable by Huskisson in 1982.

5) Margaret polden & Yill mantle - Physiotherapy in obstetrics & Gynaelogy Advice rest, TENS and exercises reduces Sacro Iliac dysfunction.

6) ME MEEKEN (1994) found pluck floor exercises using a contract relax technique as an efficient pump mechanism to increase circulation & to reduce pain.

7) Laslett M. Williams M. The reliability of selected pain provocation tests for Sacro iliac joint pathology.

8) Richard L. Don. Tigny, PT emphasized the use of educational tool to enhance the patient understand & compliance for successful results by using exercise programme designed for "PAIN MANAGEMENT FOR SACRO-ILIAC JOINT DYSFUNCTION"

9) Wallare et al (1986) examined the relation between exercise and physical discomfort during pregnancy found that women who exercised had statistically significant higher esteem & low physical discomfort scores.

10) Mannheimer (1985) Mantle (1998) states that TENS has been used successfully & safely as an alternate to other forms of analgesia.

11) Chartered physiotherapist in Northern Ireland carried out a research (1993 & 1994) & found that TENS is mostly used for pain relief. Australian Bureau of statistics (1992) estimated that 10% of womens participated in vigorous exercise.

12) Melz ack & w all (1965, 1982) in the study supports there is significant difference in reducing pain by TENS.

13) BerFoluzzi (1989) used TENS & reported a higher degree of satisfaction. Bonia (1979) states that TENS elevates opiate levels in the brain & spinal cord which reduces pain.

14) Manmhemn 1985, TENS involves the transmission of electrical energy through the skin to the nervous system. Its analgesic effects are said to be due to a gate closing mechanism in the dorsal column of spinal cord & the release & endogenous opiates.

15) BRUKNER and KAHN (1974) suggest, gentle exercise will increase the circulation to all major muscle groups & enhance Neural & corrective tissue function.

16) Walsh et al, A well conducted study (1993) has shown that significant combination of TENS frequencies & pulse length have differing influence on peripheral nerve conduction latency. It was shown that conduction was slowed in the superficial nerve.

TOOLS OF THE STUDY

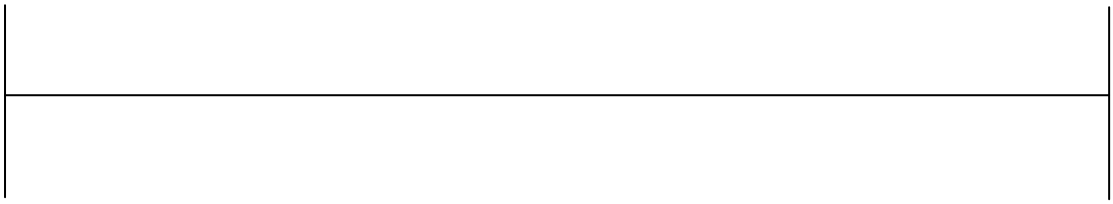
PRE TEST :

VISUAL ANALOG SCALE :

It is 10 cm long non-segmental Horizontal line with a pain descriptor at each of the line. The patients are asked to mark a point on the line which best represents their perceived level of the pain intensity.

MILD PAIN MODERATE PAIN SEVERE PAIN

0 10



NO PAIN MAXIMAL PAIN

ACTIVE STRAIGHT LEG RAISING (ASLR) :

ASLR is a stability test described by Mens et al. This test can be used to verify as to which sacro-iliac that is unstable and also as a post treatment check to determine if a trial treatment is of value. It was noticed that in posterior pelvic pain patients, there was difficulty in actively raising one (or) both legs in supine position. Many patients reported pain during this action, though most described a feeling as though they were paralyzed.

MEASUREMENT PROCEDURE :

1. During the procedure the patient was asked to score the impairment on a six-point scale.

   Not difficulty at all - 0

   Minimally difficult - 1

   Some what Difficult - 2

   Fairly difficult - 3

   Very difficult - 4

   Unable to do - 5

2. The extent of pain was determined by a visual analogue scale ranging from 0 (no pain) to 10 (maximum pain).

3. To measure posterior pelvic pain either on left side or right side by Active Straight Leg Raising Test.

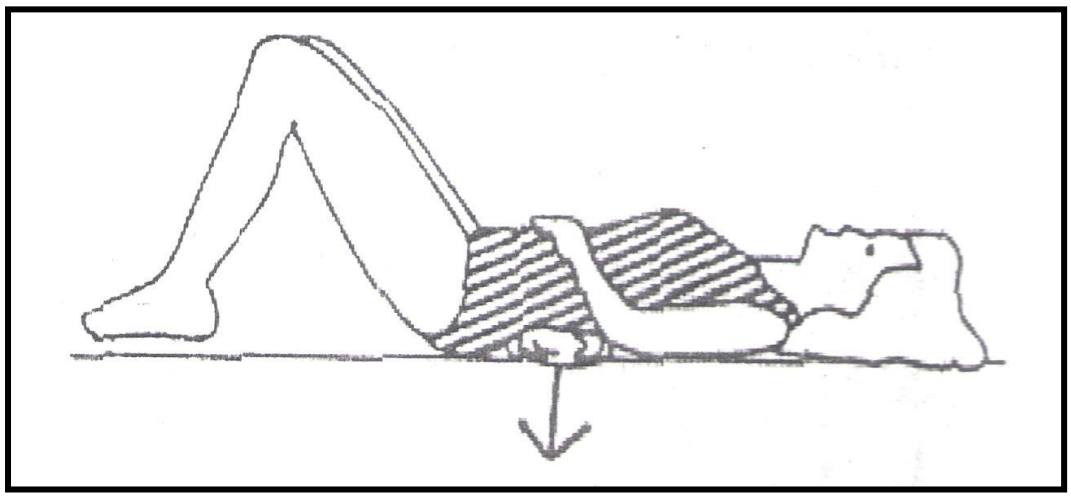
TREATMENT PROCEDURE (GROUP-I)

TENS :

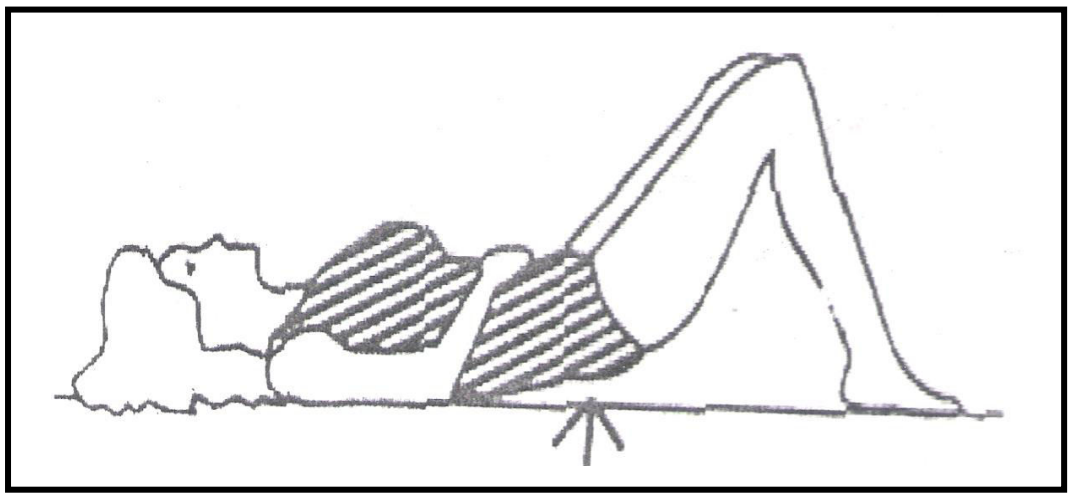
The pregnant mothers in group-I were treated with TENS with 20 Hz frequency, 80 ms pulse width, continuous mode for 30 minutes.

EXERCISE PROGRAMME :

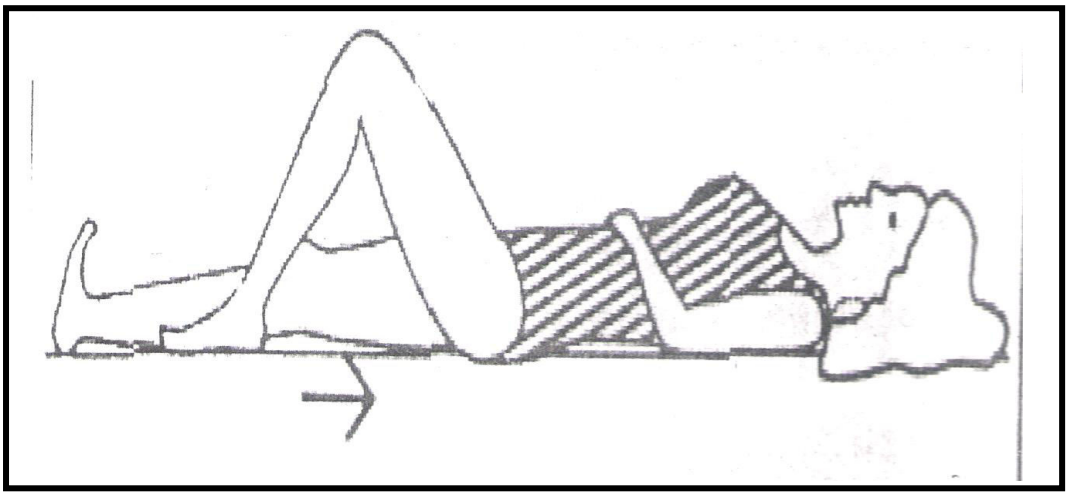
1. **Back Pressing -** Straight lying. Keeping a towel rolled up in the arch of lower back. Pressing for 5 seconds and relax for 5 seconds.



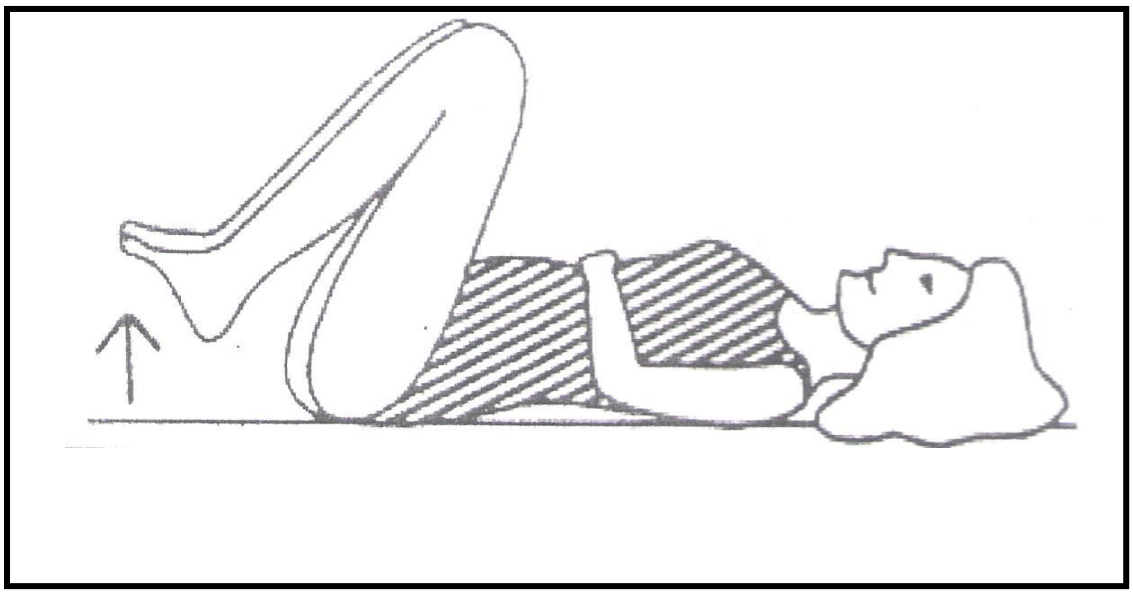
2. **Pelvic Bridging -** Straight lying. Bend both knees and try to raise the hips up and relax.



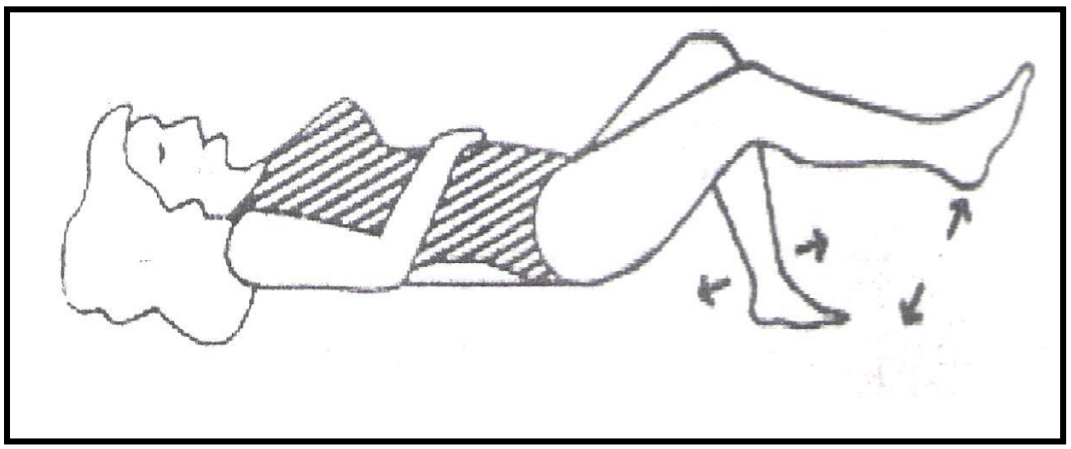
3. **Straight lying -** Bend your hip and knee and stretch alternatively.



4. **Straight lying -** Bend your hip and knees together and hold it for 5 seconds and relax.



5. **Straight lying -** Bend your hip and knee together and stretch alternate legs and relax (similar like cycling in lying).



Repeat all the exercises three on each side.

EXERCISES :

The patients carried out Exercise Programme[23] like that of Experimental Group-I.

POST TEST :

After the stipulated period of treatment, Pain and ASLR scoring was carried out as same as before the treatment. The score were recorded.

GUIDELINES FOR WOMEN EXERCISING DURING PREGNANCY

- Jerky, bouncing, ballistic movements and activities should be avoided.
- Regular mild to moderate exercise sessions, at least three times a week, are safer than intermittent bursts of activity.
- A careful ‘warm-up’ should precede vigorous exercise, which must always be followed by a ‘cool-down’ or gradual decline in activity.
- Flexibility and mobility follow the warm-up section, avoiding ballistic stretching. All main muscle groups should be included and positions stretching at the extreme range of movement avoided.
- Strenuous exercise must be avoided in hot, humid weather, or when the pregnant woman is pyrexial.
- The maternal heart rate should not exceed 140 b.p.m and vigorous exercise should not continue for longer than 15 minutes.
- Fluid must be taken before, during and after exertion to avoid dehydration, and energy intake must be sufficient for the needs of pregnancy as well as the exercise.
- As with women beginning exercise outside pregnancy, it is essential that those accustomed to a sedentary lifestyle should start with low-intensity physical activity. Walking, swimming, stationary bicycling or yoga are probably ideal, with gradual increases in activity levels according to a woman’s own individual tolerance capacity.

- An aerobic component should be in the mode best suited to the individual, using large muscle groups and being rhythmical in nature i.e. brisk walking, cycling, aerobic dance - all avoiding high impact.
- Avoid supine positions after the first trimester.
- Avoid standing motionless for long periods of time.
- Exercise should be decided by the limitations imposed by pregnancy. The competitive element must be excluded.

Traditionally, monitoring and intensity of aerobic exercise was by heart rate, but during pregnancy, it is too limited as the heart rate alters (ACSM 1995). Women should be encouraged to use the BORG rating of perceived exertion (RPE) aiming between 12 and 14 or the 'talk test' (Borg 1970).

The following list of signs and symptoms from the ACSM (1995) are considered significant and, if apparent, would need medical review :

- any signs of bloody discharge from the vagina.
- any 'gush' of fluid from the vagina (premature rupture of membranes)
- sudden swelling of ankles, hands or face.
- persistent, severe headaches or visual disturbance, or both; unexplained spell of faintness or dizziness.
- swelling, pain and redness in the calf of one leg.

- elevation of pulse rate or blood pressure that persists after exercise, excessive fatigue, palpitations and chest pain.
- persistent contractions (> 6-8 hours) that may suggest onset of premature labour.
- unexpected abdominal pain.
- insufficient weight gain (<1.0 kg/month during the last two trimesters)
- absence of or reduced foetal movements.

The women's health physiotherapist will be able to advise and encourage women wishing, with the consent of their doctors, to continue or begin.

PLAN FOR THE DATA ANALYSIS :

The data analyses were planned according to the objectives of the study.

1. Mean and Standard deviation.
2. T-test to compare the groups and to determine the effectiveness of Ultrasound therapy with exercise programme and with exercise programme alone.
3. Co-efficient of variance to determine the significant difference.

FORMULA USED :

1. Mean $\bar{x} = \Sigma X / N$
2. Standard deviation $S = \sqrt{\frac{\Sigma (x - \bar{x}_1)^2 + \Sigma (x - \bar{x}_2)^2}{N_1 + N_2 - 2}}$
3. $t = \frac{x_1 - x_2}{S} \quad X \sqrt{\frac{N_1 - N_2}{N_1 + N_2}}$
4. Co-efficient of variance

$$\frac{\sigma 1}{M} \quad X \quad 100$$

ANALYSIS AND INTERPRETATION OF DATA

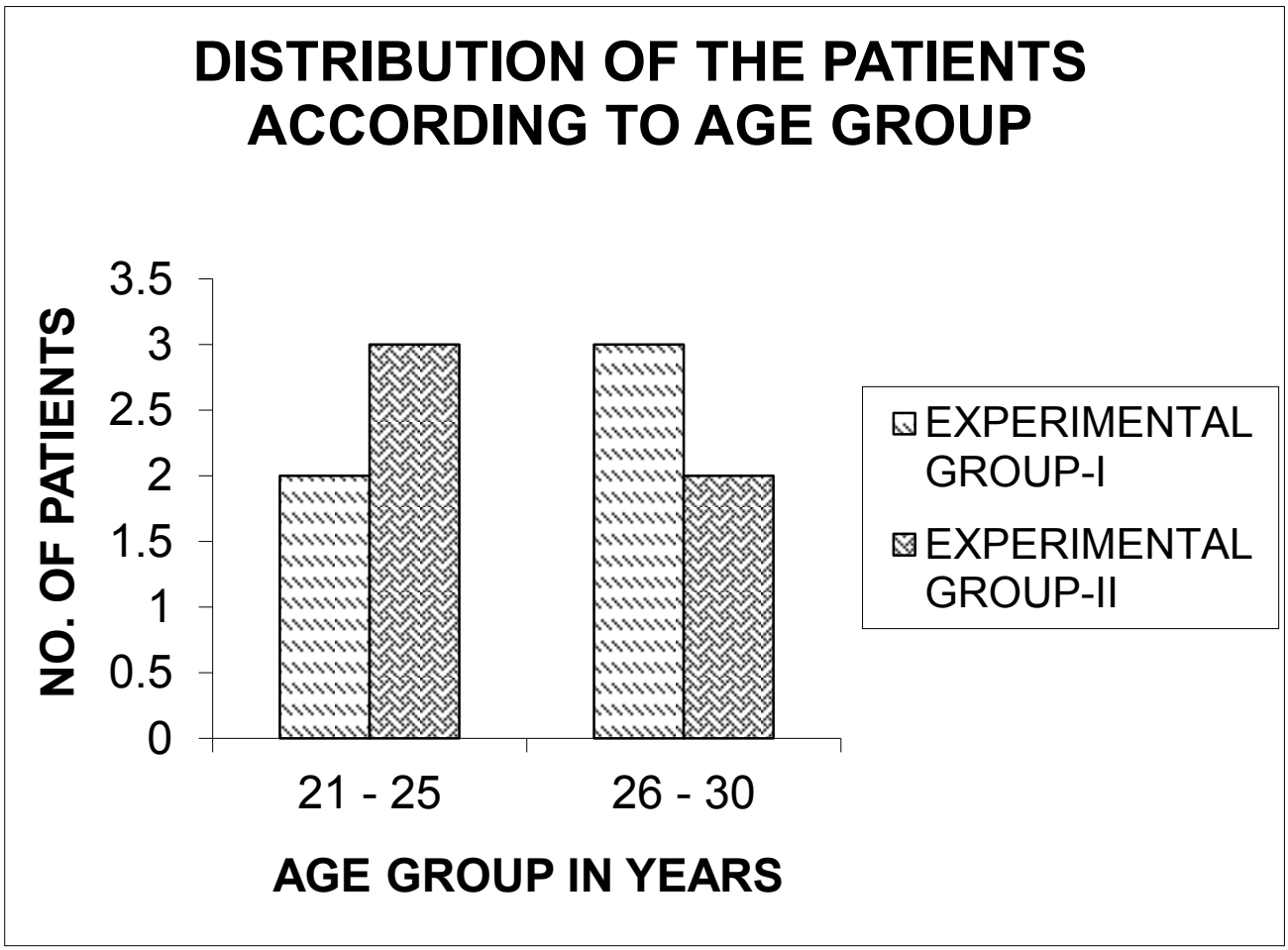
This chapter deals with the description of the sample and analysis and interpretation of data to determine the effectiveness of TENS with exercise programme and exercise programme alone. The Data obtained is classified, grouped and analyzed statistically based on the study. The study findings are presented in.

DISTRIBUTION OF THE PATIENTS ACCORDING TO AGE GROUP :

TABLE : I

SL. NO.	AGE GROUP	EXPERIMENTAL GROUP-I	EXPERIMENTAL GROUP-II
1	21 - 25	2	3
2	26 - 30	3	2
TOTAL		**5**	**5**

The above table shows that pregnant Mother's with Sacro-Iliac joint pain were distributed over all age group.

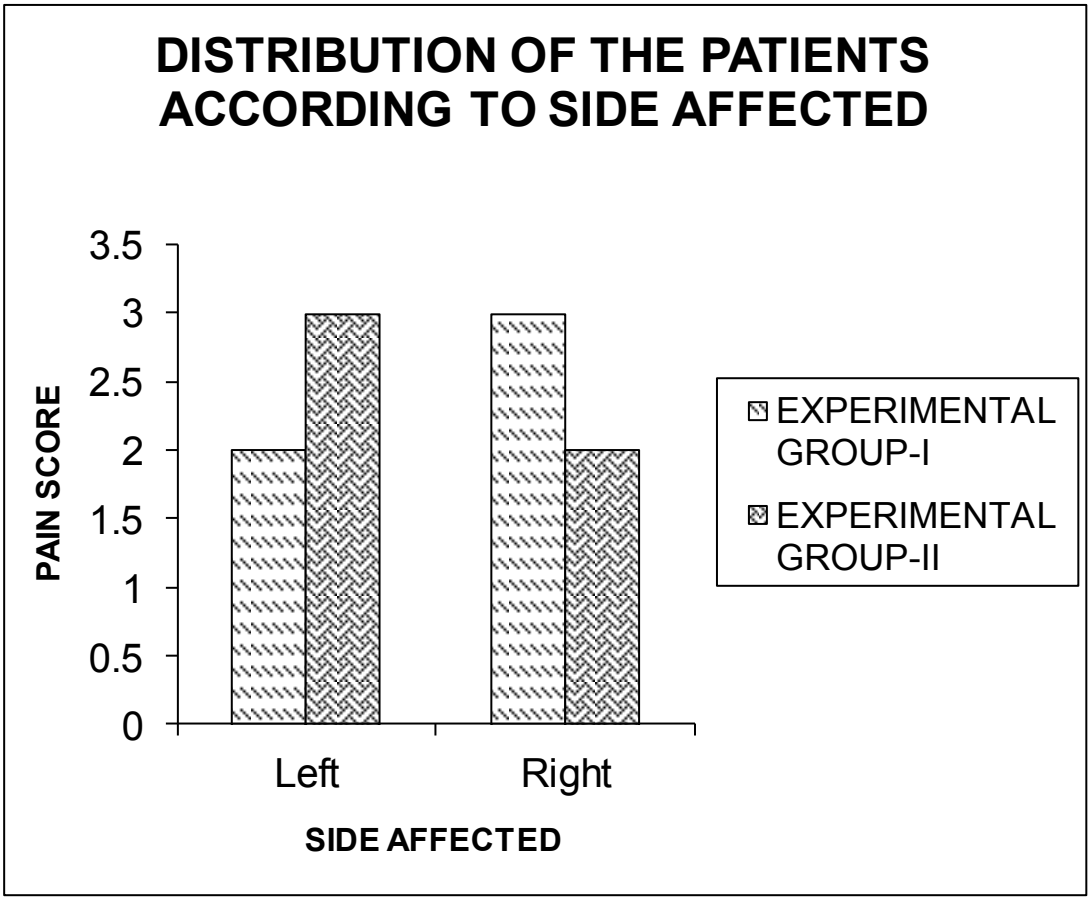

DISTRIBUTION OF THE PATIENTS ACCORDING TO AGE GROUP
NO. OF PATIENTS
3.5
3
2.5
2
1.5
1
0.5
0
21 - 25
26 - 30
AGE GROUP IN YEARS
EXPERIMENTAL GROUP-I
EXPERIMENTAL GROUP-II

DISTRIBUTION OF THE PATIENTS ACCORDING TO SIDE AFFECTED :

TABLE : II

SL. NO.	SIDE AFFECTED	EXPERIMENTAL GROUP-I	EXPERIMENTAL GROUP-I	TOTAL	%
1	Left	2	3	5	50
2	Right	3	2	5	50

The above table shows that pregnant Mother's with Sacro-Iliac joint pain were distributed equally on both sides.



PAIN RATING INDEX IN EXPERIEMENTAL GROUP - I & II :

TABLE : III

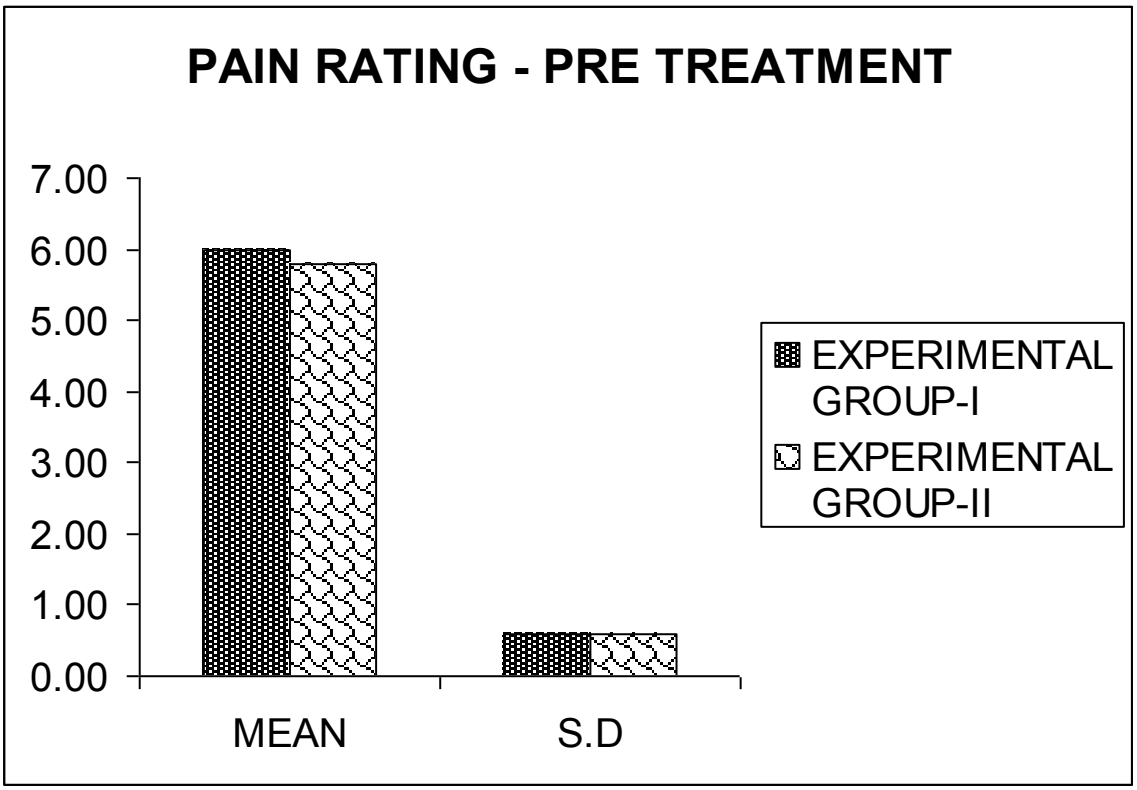
SL. NO.	GROUP	PRE TREATMENT		POST TREATMENT	
		MEAN	S.D	MEAN	S.D
1	EXPERIMENTAL GROUP - I	6.0	0.6	2.6	0.36
2	EXPERIMENTAL GROUP - II	5.8	0.59	4.8	0.49

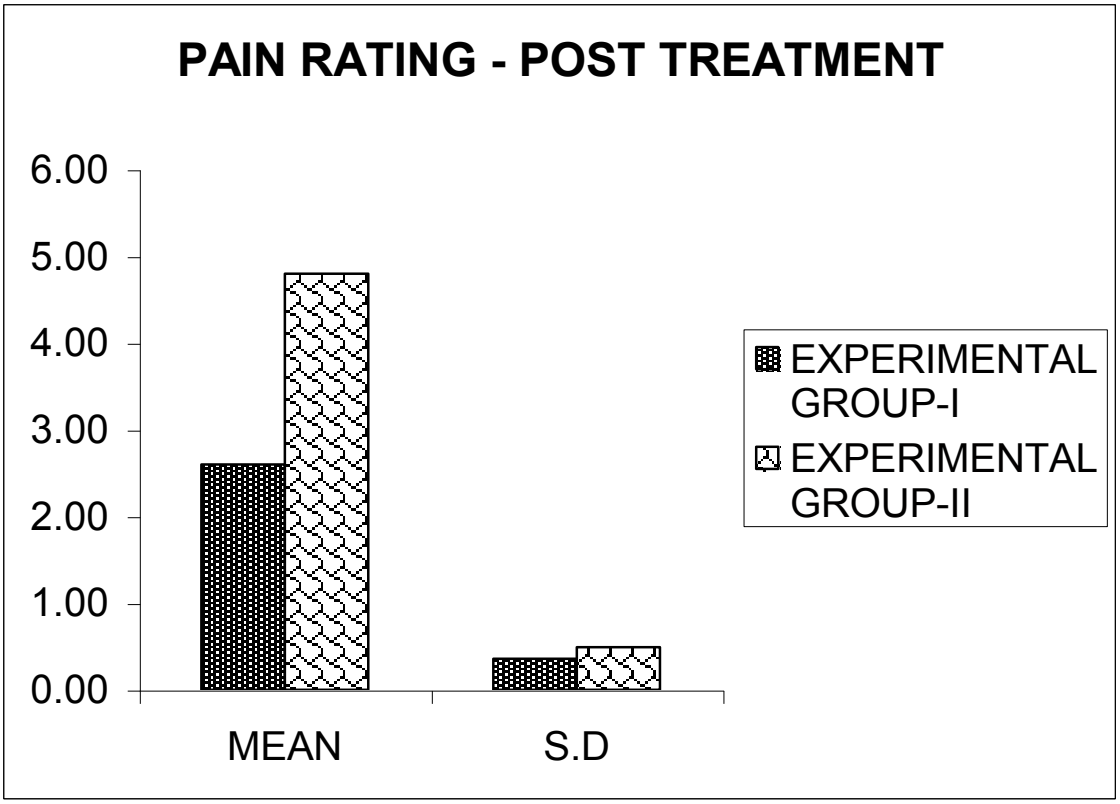
PRE TREATMENT ACTIVE STRAIGHT LEG RAISING SCORES FOR PATIENTS WITH LEFT & RIGHT SIDE STRAIN IN EXPERIMENTAL GROUP I & II :

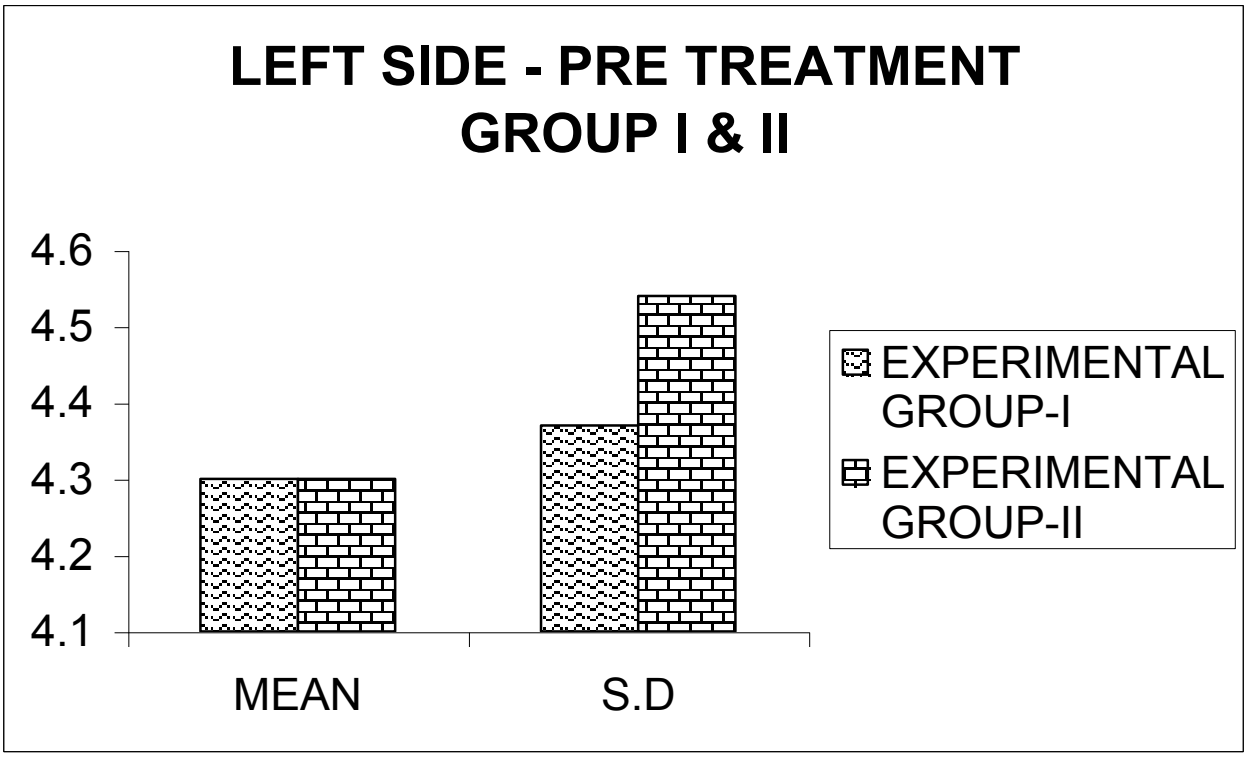
TABLE : IV

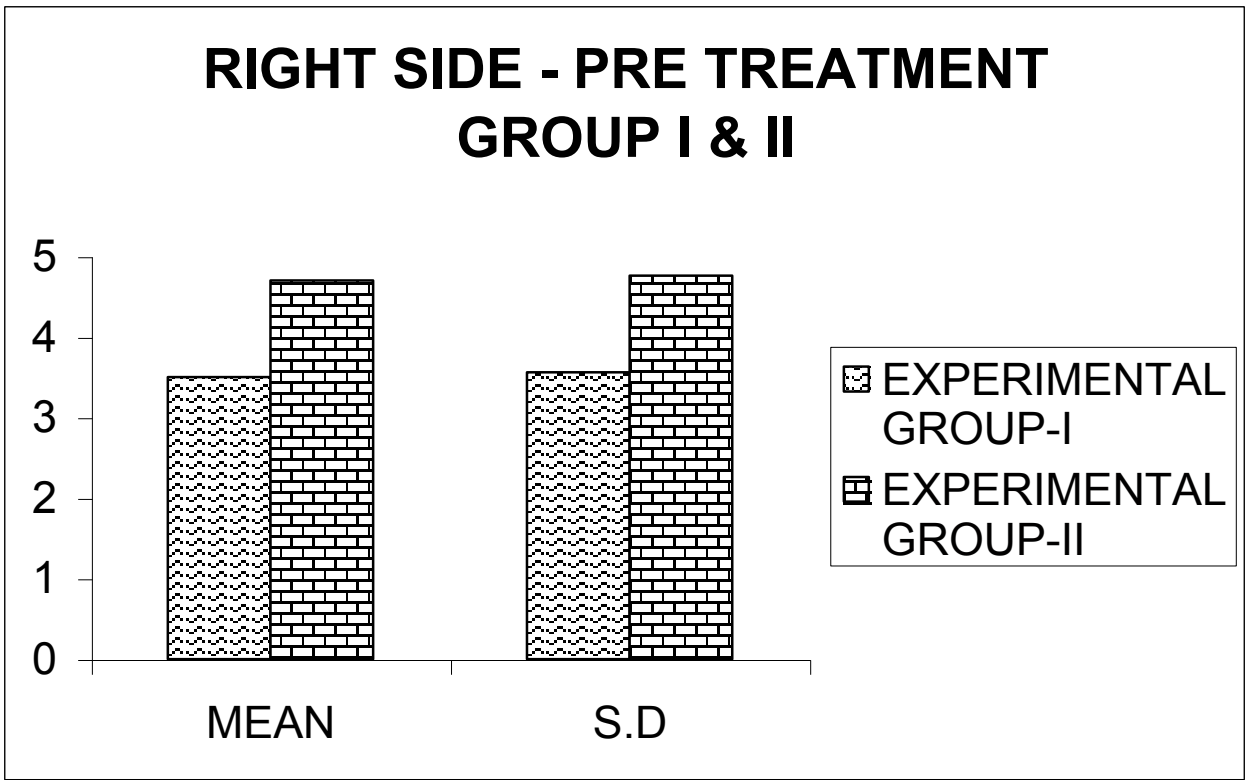
SL. NO.	GROUP	PRE TREATMENT			
		LEFT		RIGHT	
		MEAN	S.D	MEAN	S.D
1	EXPERIMENTAL GROUP - I	4.3	4.37	3.5	3.56
2	EXPERIMENTAL GROUP - II	4.5	4.54	4.7	4.76

The above table shows that the Mean and Standard deviation are more or less similar for both Experimental Group I & II in Pre-Treatment phase.


PAIN RATING - PRE TREATMENT
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
MEAN
S.D
EXPERIMENTAL GROUP-I
EXPERIMENTAL GROUP-II


PAIN RATING - POST TREATMENT
6.00
5.00
4.00
3.00
2.00
1.00
0.00
MEAN
S.D
EXPERIMENTAL GROUP-I
EXPERIMENTAL GROUP-II


LEFT SIDE - PRE TREATMENT
GROUP I & II
4.6
4.5
4.4
4.3
4.2
4.1
MEAN
S.D
EXPERIMENTAL GROUP-I
EXPERIMENTAL GROUP-II


RIGHT SIDE - PRE TREATMENT
GROUP I & II
5
4
3
2
1
0
MEAN
S.D
EXPERIMENTAL GROUP-I
EXPERIMENTAL GROUP-II

POST TREATMENT ACTIVE STRAIGHT LEG RAISING SCORES FOR PATIENTS WITH LEFT & RIGHT SIDE STRAIN IN EXPERIMENTAL GROUP I & II :

TABLE : V

SL. NO.	GROUP	POST TREATMENT			
		LEFT		RIGHT	
		MEAN	S.D	MEAN	S.D
1	EXPERIMENTAL GROUP - I	1.3	1.32	1.6	1.62
2	EXPERIMENTAL GROUP - II	4.8	4.48	3.2	3.26

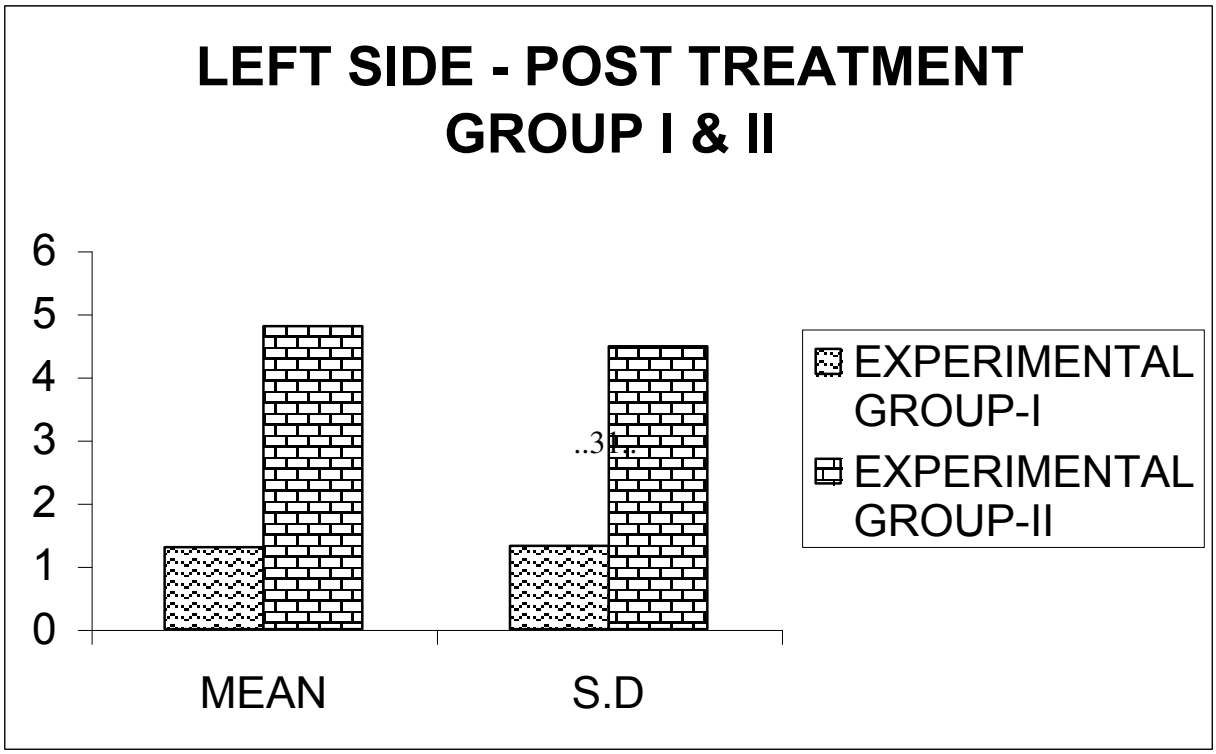
The above table shows that the Mean and Standard deviation has a significant difference between Experimental Group I & II in Post-Treatment phase.

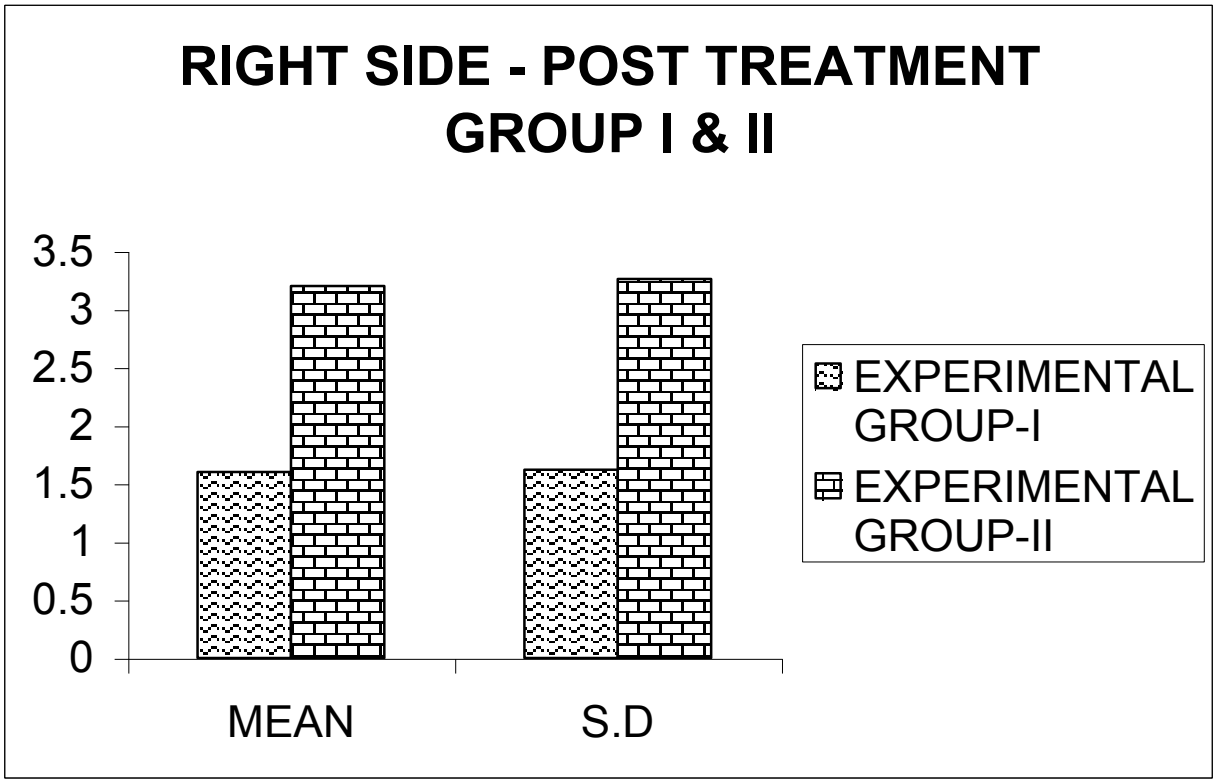
MEAN, STANDARD ERROR & "t" VALUE FOR ASLR SCORES IN EXPERIMENTAL GROUP I :

TABLE : VI

SL. NO.	PRE-TEST	POST-TEST	S	't' VALUE
1	2	2	0.762	4.320

In Experimental Group I, the calculated " t " value is > table value of " t " at 0.05 level (1.86). Hence this implies a markable significant difference between pre treatment and post treatment for Experimental Group I with TENS and Exercises.


LEFT SIDE - POST TREATMENT
GROUP I & II
6
5
4
3
2
1
0
MEAN
S.D
EXPERIMENTAL GROUP-I
EXPERIMENTAL GROUP-II


RIGHT SIDE - POST TREATMENT
GROUP I & II
3.5
3
2.5
2
1.5
1
0.5
0
MEAN
S.D
EXPERIMENTAL GROUP-I
EXPERIMENTAL GROUP-II

MEAN, STANDARD ERROR & "t" VALUE FOR ASLR SCORES IN EXPERIMENTAL GROUP II :

TABLE : VII

SL. NO.	PRE-TEST	POST-TEST	S	't' VALUE
1	1.4	2.6	0.7048	2.5634

In Experimental Group II, the calculated " t " value is > table value of " t " at 0.05 level (1.86). Hence there is a significant difference before and after treatment.

CO-EFFICIENT OF VARIANCE FOR EXPERIMENTAL GROUP I & II BASED ON "t" VALUE IN PSOT TREATMENT PHASE :

TABLE : VIII

SL. NO.	GROUP	MEAN	σ	C.V
1	EXPERIMENTAL GROUP - I	1.6	0.7266	40.326
2	EXPERIMENTAL GROUP - II	3.4	0.7462	22.462

EXPERIMENTAL GROUP-I

Post Treatment Mean = 1.6

Co-Efficient of Variance = 40.326

EXPERIMENTAL GROUP-II

Post Treatment Mean = 3.4

Co-Efficient of Variance = 22.462

These values implies Experimental Group I is better than

..33..

Experimental Group II (i.e) treatment with TENS and Exercises is better than treatment with Exercise alone in management of Sacro-Iliac Joint Pain in pregnant mothers.

RESULTS :

The results of Pain Rating Score in Experimental Group I & II is given in Table III.

In pre treatment session, Experimental Group I has a Mean of 5.9 and Standard Deviation 0.60, Experimental Group II has a Mean of 6.1 and Standard Deviation of 6.1.

The Mean Difference is same for both Group in Pre-treatment session.

Whereas in Post Treatment session Experimental Group I has a Mean of 2.9 and Standard Deviation of 0.41. Experimental Group II has a Mean of 5.1 and Standard Deviation of 0.58.

This results indicates a significance difference in Pain Score in Experimental Group I (post treatment).

The results of Active Straight Leg Raise scores for Experimental Group I is given in Table VI.

In Experimental Group I, the calculated " t " value is > table value of "t " at 0.5 level (1.86).

Hence this implies a markable significant difference between pre treatment and post treatment for Experimental Group I with Ultrasound Therapy and Exercises.

The Co-efficient of Variance for Post Treatment phase for Experimental Group I & II is given in Table III.

The Co-efficient of Variance for Experimental Group I is 41.573 and for Experimental Group is 24.478.

These values implies Experimental Group I is better than Experimental Group II i.e. Treatment with Ultra sound Therapy and exercise is better than Treatment with TENS and exercise in management of Posterior Pelvic Pain in Post Partum Mothers.

It is essential that all treatment be appropriate to assessment findings. An exercise programme - whether land or water-based may be appropriate to maintain treatment results. Though Tulder et al (2002), when analysing 39 randomly controlled trails, found little evidence to indicate that specific exercises are effective for the treatment of low back pain, when comparing them to inactive treatments they do suggest these may be of benefit to facilitate return to daily activities.

DISCUSSION

The purpose of this study was to differentiate the outcome effects of TENS (Transcutaneous Electrical Nerve Stimulation) in reducing Sacro-Iliac Joint Pain that arises during pregnancy.

TENS being a pain reliving modality fulfills the criteria of application of external stimulation during pregnancy. Since the effects of TENS are limited to the superficial nerves, no underlying structures are affected.

Exercise Programme, formulated within the suitable intensity and ability based on pregnancy helps to maintain muscle properties and extensibility to overcome the muscular stress during pregnancy. Two groups consisting of 5 pregnant mothers in each were taken for the study.

Group I underwent TENS and exercise programme.

Group II were exclusively given exercise programme alone.

Based on the Testing Tools VAS (Visual Analogue Scale) and ASLR (Active Straight Leg Test) the pre treatment and post treatment scores were derived and statistically analyzed.

Based on the results obtained the hypothesis was tested and accrued. The statistical results obtained showed that Experiemental Group - I who received TENS and exercise programme showed considerable reduction in pain when compared to the Experimental Group - II who were treated with exercise programme alone. ..39..

The scores of active straight leg raising also revealed that Experimental Group - I showed good improvement in raising than Experimental Group - II.

CONCLUSION

Based on the results and the limitation of the study the following conclusion were established.

The effectiveness of TENS combined with exercise programme in reducing Sacro-Iliac Joint Pain is significant at 4.320 level.

The effectiveness of exercise programme alone in reducing Sacro-Iliac Joint Pain is significant at 2.5334 level.

From the statistical analysis of the derived data and level of significance it is concluded that TENS with exercise programme is effective.

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